

CLAIMS

1. (Previously Presented) A method of boring hard rock by means of a tunnel boring machine comprising hardened steel discs which protrude from the cutting head, wherein wear in the cutting head is reduced, comprising tunnel boring in hard rock, and adding at the cutting head while boring a foamed aqueous liquid composition injected at the interface of the cutting head and the hard rock, which composition comprises a foaming agent and a lubricant, the lubricant being selected from high molecular weight polyethylene oxides.
2. (Previously Presented) The method of claim 1, in which the individual ingredients of the foaming composition are dispensed in individual aqueous form into water and are converted to foam.
3. (Previously Presented) The method of claim 1 wherein the foaming agent is at least one of anionic or nonionic surfactants.
4. (Previously Presented) The method of claim 1, in which the composition is supplied as a concentrate, which is diluted with water in situ, to provide the foaming composition.
5. – 20. Canceled.
21. (Previously Presented) The method of claim 3, wherein at least one surfactant is nonionic and comprises at least one of alkanolamines, aminoxides, ethoxylated alcohols, ethoxylated alkylphenols, ethoxylated esters, glucose esters, sucrose esters or derivatives thereof.
22. (Previously Presented) The method of claim 1, in which the polyethylene oxide has a weight average molecular weight of at least 1,000,000.
23. (Previously Presented) The method of claim 4, in which the concentrate is added in an amount of about 0.5 to about 10 kg/m³ of rock removed.

24. (Previously Presented) The method of claim 4, in which the wear-reducing foamable liquid concentrate also contains at least one of a sequestering agent or foam booster, in which the components of the wear-reducing foamable liquid concentrate are present in the following amounts:

- 0.1% to 3% polyethylene oxide;
- 2% to 40% foaming agent;
- from greater than 0% to 5% sequestering agent; and
- from greater than 0% to 10% foam booster;

by weight of liquid composition, the remainder being water.

25. (Previously Presented) The method of claim 24, in which the wear-reducing foamable liquid concentrate is diluted in about 1 to about 20 volumes of water and foamed to provide a volume expansion of from about 5 to about 40 times the volume of the unfoamed material.

26. (Previously Presented) The method of claim 1 wherein the foaming agent is at least one nonionic surfactant.

27. (Previously Presented) The method of claim 26, in which the nonionic surfactant comprises at least one of alkanolamines, aminoxides, ethoxylated alcohols, ethoxylated alkylphenols, ethoxylated esters, glucose esters, sucrose esters or derivatives thereof.